

Cucumaria frondosa* (Orange-footed Sea Cucumber)*Priority 2 Species of Greatest Conservation Need (SGCN)****Class:** *Holothuroidea* (Sea Cucumbers)**Order:** *Dendrochirotida* (Sea Cucumbers)**Family:** *Cucumariidae* (Sea Cucumbers)**General comments:**

General information:

<http://www.maine.gov/dmr/cukes/index.htm>**No Species Conservation Range Maps Available for Orange-footed Sea Cucumber****SGCN Priority Ranking - Designation Criteria:****Risk of Extirpation: NA****State Special Concern or NMFS Species of Concern: NA****Recent Significant Declines:**

Orange-footed Sea Cucumber is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.

Notes:

recent decline: ME DMR unpublished data from annual dive survey, 2010-13

<http://www.maine.gov/dmr/cukes/chen2007.pdf>

clim

Regional Endemic: NA**High Regional Conservation Priority: NA****High Climate Change Vulnerability:***Cucumaria frondosa* is highly vulnerable to climate change.**Understudied rare taxa: NA****Historical: NA****Culturally Significant: NA****Habitats Assigned to Orange-footed Sea Cucumber:****Formation Name Intertidal****Macrogroup Name Intertidal Gravel Shore**

Habitat System Name: Lower Intertidal ****Primary Habitat**** **Notes:** spawning, assumed juvenile feeding habitat, adult feeding habitat

Formation Name Subtidal**Macrogroup Name Subtidal Bedrock Bottom**

Habitat System Name: Bedrock ****Primary Habitat**** **Notes:** primary for adult and juvenile, spawning, juvenile and adult feeding habitat, assumed over-wintering habitat

Habitat System Name: Kelp Bed **Notes:** juvenile, adult

Macrogroup Name Subtidal Coarse Gravel Bottom

Habitat System Name: Coarse Gravel ****Primary Habitat**** **Notes:** spawning, assumed juvenile feeding habitat, adult feeding habitat, and over-wintering habitat

Habitat System Name: Erect Epifauna ****Primary Habitat**** **Notes:** spawning, assumed juvenile feeding habitat, adult feeding habitat, and over-wintering habitat

Macrogroup Name Subtidal Pelagic (Water Column)

Habitat System Name: Nearshore **Notes:** larval development and dispersal

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Formation Name Subtidal

Habitat System Name: Offshore **Notes:** larval development and dispersal

Macrogroup Name Subtidal Sand Bottom

Habitat System Name: Unvegetated ****Primary Habitat**** **Notes:** spawning, assumed juvenile feeding habitat, adult feeding habitat

Stressors Assigned to Orange-footed Sea Cucumber:

Stressor Priority Level based on Severity and Actionability		Moderate Severity	High Severity
	Highly Actionable	Medium-High	High
	Moderately Actionable	Medium	Medium-High
	Actionable with Difficulty	Low	Low

IUCN Level 1 Threat Biological Resource Use

IUCN Level 2 Threat: Fishing and Harvesting of Aquatic Resources

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: Maine's sea cucumber stock has probably been over-fished, but lacks a formal assessment. The threat of over-fishing is moderately certain, moderately likely, and probably spatially patchy. However, significant reductions in fishing pressure have occurred recently (2013, 2014). More information is needed to understand the relationships between fishing and stock abundance.

IUCN Level 1 Threat Pollution

IUCN Level 2 Threat: Agricultural and Forestry Effluents

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including pesticides and chemical therapeutants), and/or sediments. Adults are sensitive, but comparatively to larvae, less effected.

IUCN Level 2 Threat: Domestic and Urban Waste Water

Severity: Severe **Actionability:** Moderately actionable

Notes: Echinoderm larvae are exceptionally sensitive to excessive nutrients, toxic chemicals (including pesticides and chemical therapeutants), and/or sediments. Adults are sensitive, but comparatively to larvae, less effected.

IUCN Level 2 Threat: Industrial and Military Effluents

Severity: Severe **Actionability:** Moderately actionable

Notes: Oil spills are toxic to species with intertidal distributions. Local scale spills have an unpredictable likelihood and actionability is moderate and influenced by response time to spills.

IUCN Level 1 Threat Climate Change and Severe Weather

IUCN Level 2 Threat: Habitat Shifting or Alteration

Severity: Moderate Severity **Actionability:** Actionable with difficulty

Notes: The impacts of increasing ocean acidification on sea cucumbers is poorly understood (low certainty), but the effects of the threat are likely to occur, statewide (pervasively), given that sea cucumbers have calcified body structures.

IUCN Level 2 Threat: Temperature Extremes

Severity: Severe **Actionability:** Actionable with difficulty

Notes: Orange-footed sea cucumbers are cold-water species. Increased water temperatures have interactive effects with ocean pH decreasing survivorship of larvae and growth rate of echinoderms. Likelihood is high (high certainty) and large scale. The ability to mitigate sea temperature change is low.

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IUCN Level 1 Threat Invasive and Other Problematic Species, Genes and Diseases

IUCN Level 2 Threat: Invasive Non-native-Alien Species-Diseases

Severity: Moderate Severity

Actionability: Actionable with difficulty

Notes: Invasives such as encrusting colonial tunicates (*Didemnum vexillum*) could decrease availability of habitat and have other effects largely unknown at this time. Likelihood is high and large scale (throughout the region), so actionability is low.

Species Level Conservation Actions Assigned to Orange-footed Sea Cucumber:

**Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.*

Conservation Action	Category: Survey and Monitoring	Biological Priority: high	Type: new
Monitor stock status through surveys and sampling programs			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Research	Biological Priority: high	Type: new
Conduct research to support management, including stock assessments, e.g. development of predation, reproduction, growth and aging data and habitat mapping			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Public Outreach	Biological Priority: high	Type: on-going
Design and encourage the use of more size-selective fishing gear			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Research	Biological Priority: moderate	Type: new
Assess the feasibility and advantages of local or area species management approaches			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Species Management	Biological Priority: moderate	Type: new
Support community engagement in developing a fisheries management plan			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Actions Associated with the Echinoderms Guild:

Conservation Action	Category: Research	Biological Priority: high	Type: on-going
Expand existing education and research among researchers and managers to improve understanding and management ability			

Stressor(s) Addressed By This Conservation Action

Domestic and Urban Waste Water

Conservation Action	Category: Policy	Biological Priority: critical	Type: on-going
Through education and collaboration, reduce the use of antifouling agents and biocides that negatively affect SGCN, and investigate alternative biofouling agents.			

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Stressor(s) Addressed By This Conservation Action

Marine and Freshwater Aquaculture

Conservation Action	Category: Public Outreach	Biological Priority: high	Type: on-going
Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Research	Biological Priority: high	Type: new
Investigate the effect of various harvesting practices on the integrity of habitats and trophic and ecological systems			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Survey and Monitoring	Biological Priority: high	Type: on-going
Ground-truth mapped habitat and compare to historical maps to monitor change over time, may require updating mapping plans to map more frequently			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Research	Biological Priority: high	Type: on-going
Conduct research to support management, including but not limited to stock assessments, population genetics, population monitoring, etc.			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Public Outreach	Biological Priority: high	Type: on-going
Encourage the use of more targeted fishing gear in order to reduce bycatch and habitat disturbance			

Stressor(s) Addressed By This Conservation Action

Fishing and Harvesting of Aquatic Resources

Conservation Action	Category: Research	Biological Priority: high	Type: new
Research to understand how effects such as habitat modifications, population changes, and pollution can influence SGCN			

Stressor(s) Addressed By This Conservation Action

Habitat Shifting or Alteration

Conservation Action	Category: Research	Biological Priority: high	Type: new
Identify species that are resilient to ocean acidification (OA) and rises in sea surface temperature (SST).			

Stressor(s) Addressed By This Conservation Action

Habitat Shifting or Alteration

Broad Taxonomic Group Conservation Actions:

Additional relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing

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relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.